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DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Improvements in or relating to toy and model vehicles

We, LESNEY PRODUCTS & CO. LIMITED, a British Company of Lee Conservancy Road, Hackney Wick, London, E.9., do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to toy and model vehicles all of which will hereinafter be referred to as "toy" vehicles for the sake of brevity.

An object of the invention is to render small-scale toys of this kind readily steerable in a simple manner which does not add materially to the cost of their production.

According to the invention, there is provided a toy vehicle having a pair of steerable wheels mounted on stub axles that are displaceable about swivel pins whose axes do not intersect, and are substantially perpendicular to, those of the stub axles, wherein the swivel pins are interconnected by a synthetic plastics member which integrally includes a resilient portion that is arranged to tend to maintain the stub axles substantially perpendicular to the length of the toy and to be resiliently deformed to allow the stub axles to turn about the swivel pins by the application of manual pressure to the toy.

For a better understanding of the invention, and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:—

Figure 1 is a plan view of parts of a toy car in accordance with the invention,

Figure 2 is a section taken on the line II-II of Figure 1,

Figure 3 is a plan view, to an enlarged scale, of part of the steering mechanism of the toy of Figures 1 and 2,

Figure 4 is a part-sectional side elevation corresponding to Figure 3,

Figure 5 is a plan view of parts of an alternative embodiment of a toy car in accordance with the invention,

Figure 6 is a section taken on the line VI-VI of Figure 5,

Figure 7 is a vertical longitudinal section of a toy ambulance having further alternative parts constructed in accordance with the invention, and

Figure 8 is a plan view showing certain parts of the steering mechanism of the toy ambulance of Figure 7 disconnected from one another and in greater detail.

Referring to Figures 1 to 4 of the drawings, Figures 1 and 2 show a toy saloon car having a body 1 made from die cast metal, a chassis or base 2 made from die cast metal and a rear axle 3 having rotatable wheels 4 mounted at its opposite ends. Details of the construction and arrangement of these parts are not relevant to the present invention and, therefore, no further description of these parts will be given.

Figures 3 and 4 show the steering mechanism of the toy car before it is fitted to the latter. In this embodiment, the whole mechanism is moulded integrally in one piece from polypropylene which has been found to be particularly suitable for this purpose. However, other synthetic plastics materials may be employed if desired. The steering mechanism includes a pair of swivel blocks 5 only one of which can be seen in Figures 3 and 4. The second relatively symmetrical swivel block 5 has been omitted from Figures 3 and 4 for the sake of simplicity but it can be seen in Figure 1 of the drawings to which further reference will subsequently be made. Each swivel block 5 carries a swivel pin 6 and is formed with a hollow boss 7 adapted to receive a

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corresponding stub axle 8 (Figures 1 and 2).

The two swivel blocks 5 are integrally linked to opposite ends of a connecting member in the form of a profiled track rod 10 by corresponding necks 9. The centre point of the track rod 10 is integrally connected to one end of a resilient strip-shaped portion 11 the general plane of which, as can be seen in Figures 1 to 4, is vertically disposed. The end of the portion 11 remote from the track rod 10 is integrally connected to a relatively perpendicular anchor portion 12 the mid-point of which is formed with a hollow anchorage boss 13 and the opposite ends of which are formed with bearing holes 14.

Figures 3 and 4 show the steering mechanism after moulding and it will be evident that the whole mechanism can be moulded in one piece in a relatively cheap substantially uni-planar mould. Before fitting the mechanism to the toy of which it is to form a part, the metal stub axles 8 are fastened in the bosses 7 in known manner and one end of each swivel pin 6 is entered through that one of the two bearing holes 14 which is nearest to it. This is achieved by twisting each swivel block 5 through 90° relative to the track rod 10, said twisting movement torsionally deforming the corresponding neck 9. Each swivel block 5 can then be turned through 90° relative to the track rod 10 after which one end of each swivel pin 6 can be entered in the corresponding bearing hole 14. This bending movement, also, is permitted by resilient deformation of the necks 9. A comparison between Figure 3 and Figure 1 of the drawings will show the configuration of the steering mechanism before and after the operations that have just been described.

In the fitting of the steering mechanism to the toy car, the anchorage boss 13 is fastened by a rivet 15 (Figure 2) to a further fixing boss 16 projecting upwardly from the chassis or base 2 of the toy, the rivet 15 being integral with the boss 16. The ends of the two swivel pins 6 that are remote from the ends entered through the bearing holes 14 are entered through further bearing holes formed in the chassis or base 2. Front wheels 17 are rotatably mounted on the stub axles 8 at some convenient time before or during the fitting procedure which has just been described in outline.

When the toy is completed, it can be steered by pressing its wheels manually into contact with the ground and, at the same time, exerting a manual pressure in a direction extending substantially horizontally and substantially perpendicular to the longitudinal axis of the toy. If, for example, such pressure is exerted in the direction indicated by the arrow A in the plan view of Figure 1, the swivel blocks 5, swivel pins 6, stub axles 8 and front wheels 17 will all tend to be turned in the direction indicated by the arrow B about the vertical axes afforded by the swivel pins 6 due to the fact that the points of contact of the wheels 17 with the ground are spaced rearwardly of the toy from the axes of the swivel pins 6. The two necks 9 and the track rod 10 will move in the direction indicated by the arrow C against the resilient opposition of the strip-shaped portion 11 which, as will be evident from the drawings, is arranged to tend to maintain the stub axles 8 substantially perpendicular to the length of the toy so that the toy will normally move in a straight line. The two necks 9 that interconnect the track rod 10 and swivel blocks 5 bend to allow the necessary relative movement. As soon as the manual pressure in the direction A is released, the resilient strip-shaped portion 11 regains the position illustrated in Figures 1 and 2 so that straight-line steering is restored. It will be noted that the toy steers in the same direction as the direction of application of the force A.

It is within the scope of the invention to mould polypropylene or other synthetic plastics stub axles 8 integrally with the swivel blocks 5 of the steering member thus saving one step in the assembly of the toy. In this case, it is preferred to mould the swivel pins 6 vertically and the stub axles 8 horizontally since this makes it unnecessary to torsionally deform the necks 9 during assembly of the toy. The necks 9 which have been described are of circular cross-section and preferably have a diameter of 0.020 inches (0.51 mm.) which has been found to give sufficient flexibility without loss of strength when the steering mechanism is formed from polypropylene. In the case which has just been mentioned in which torsional deformation of the necks 9 is not required, they can be strip-shaped with the plane of the strip substantially vertically disposed.

The toy saloon car which is illustrated in Figures 5 and 6 of the drawings is basically similar to the one which has already been described and, therefore, parts which are similar, or identical, to parts illustrated in Figures 1 to 4 of the drawings will be denoted by the same reference numerals as are used in those Figures. The toy saloon car of Figures 5 and 6 is provided with a resilient suspension, this suspension being effected by means of a resilient strip 18 which may be formed from a synthetic plastics material such as polystyrene, polypropylene or high density polyethylene or, alternatively, from spring steel. The strip 18 is rigidly secured to the chassis or base 2

by a forward rivet 19 integrally mounted on top of a boss 20 and by a rearward rivet 21 that is directly mounted on the chassis or base 2. The rear end of the strip 18 bears centrally against the rear axle 3 of the toy car and urges said axle downwardly against the chassis or base 2. The opposite ends of the axle 3 are entered through substantially vertically extending slots (not visible in Figures 5 and 6) so that said axle can move upwardly of the slots, when a downward pressure is applied to the toy car, against the action of the resilient strip 18.

It will be seen from Figure 5 of the drawings that the forward end of the strip 18 is of forked formation and it should be noted that the whole strip 18 is shown in Figure 5 as being formed from a transparent material to avoid concealing parts that are disposed beneath it. It will be realised that, in practice, the strip 18 will not normally be transparent. In this case, the two swivel blocks 5 are formed separately from, preferably, die cast metal, each block 5 incorporating the corresponding swivel pin 6 and also a vertical pivot pin 22 by which the rear end of each block is pivotally connected to a corresponding end of the track rod 10. As can be seen best in Figure 6 of the drawings, the upper end of each swivel pin 6 is entered through a corresponding hole formed near the extremity of one of the forks of the leading end of the strip 18. Moreover, the lower end of each pin 6 is entered through a hole formed in the chassis or base 2 whilst the uppermost extremity of the upper end of each pin 6 is located just within the mouth of a blind bore formed in a boss 23 depending from a body portion of the toy car which is not shown. As in the previous embodiment, the blocks 5 which include the swivel pins 6 are interconnected by a member in the form of the track rod 10 which track rod integrally includes the resilient strip-shaped portion 11. The boss 13 at the leading end of the strip-shaped portion 11 is secured to the fixing boss 16 in such a way that it cannot turn relative to that boss, the anchor portion 12 being omitted in this embodiment.

The integral parts 10 and 11 are formed from a resilient synthetic plastics material which is preferably polypropylene and, in the use of the toy, the resilient formation of the strip 11 tends to maintain the axles 8 substantially perpendicular to the length of the toy whilst allowing it to be steered in the manner previously described by the application of manual pressure to the toy. In this case, the pivot pins 22 allow relative movements between the track rod 10 and the swivel blocks 5 rather than providing for such movement by resilient deformation of the necks 9. As can be seen in Figure 6 of the drawings, the resilient suspension strip 18 occupies a position such that its leading forked end urges the two swivel blocks 5 axially downwardly of the swivel pins towards the chassis or base 2. However, downward pressure upon the front end of the toy car urges said blocks 5 upwardly against the resilient opposition of the strip 18 so that the swivel pins 6 are displaced upwardly in an axial direction, their upper ends entering the bores formed in the bosses 23. It will be seen from the drawing that vertical displacement of the blocks 5 can only take place up to the point at which the upper side of the strip 18 surrounding the pins 6 comes into contact with the lowermost ends of the bosses 23 and that, when this condition is reached, the lowermost ends of the pins 6 will not have been brought clear of the holes in the chassis or base 2 through which they are entered. Upon the removal of downward manual pressure upon the front end of the toy, the resiliency of the strip 18 immediately brings the various parts back to the relative positions which they are shown as occupying in Figure 6.

The embodiment which is illustrated in Figures 7 and 8 of the drawings is once again basically similar to the two embodiments which have already been described and, therefore, the same reference numerals are used to indicate parts which are identical, or similar, to parts that have already been described. In this case, only the rear wheels 4 of the toy ambulance are resiliently suspended with the aid of a short resilient strip 18 whose leading end is secured to an anchorage 24 on the upper side of the chassis or base 2 of the toy. The strip 18 acts in the same way as has already been described in relation to the rear axle 3 and wheels 4 that are shown in Figure 5 of the drawings. It can be seen from Figure 8 that the track rod 10, the resilient strip-shaped portion 11 and the anchor portion 12 are all formed integrally from a synthetic plastics material which is preferably, but not essentially, polypropylene. However, once again, the two swivel blocks 5 are formed separately and are preferably made from die cast metal. Only one of the swivel blocks 5 is shown in the plan view of Figure 8 and it will be seen that it integrally includes the corresponding swivel pin 6 and the corresponding pivot pin 22 by which it is pivotally connected to one end of the track rod 10 during assembly of the toy. It can be seen in Figure 7 of the drawings that both each swivel pin 6 and each pivot pin 22 have symmetrical upper and lower ends. This enables a single swivel block 5 to be produced which can be used at either the left- or the right-hand side of

the toy ambulance with either one, or the other, side uppermost. Thus, mistakes which might otherwise occur during assembly of the toy are avoided.

It will be apparent that, when assembled, the toy ambulance described with reference to Figures 7 and 8 of the drawings is steered in exactly the same way as the two toys which have already been described, the relative movement between the track rod 10 and the swivel blocks 5 once again being allowed by the pivot pins 22 rather than by the use of the resiliently deformable necks 9. In this case, however, the leading end of the toy is not provided with any resilient suspension. It will be noted that in the cases of all three of the toys which have been described, there is no steering gear, such as a steering wheel or steering lever, operatively connected to the steering mechanism and that steering is effected solely by a child or other person urging the toy manually to the left or to the right so that the steering mechanism which has been described reacts to cause the toy to turn in the desired direction whilst the manual pressure is maintained. Steering mechanism of the kind which has been described renders small-scale toy vehicles readily steerable in a simple manner which does not add materially to the cost of their production.

WHAT WE CLAIM IS:—

1. A toy vehicle having a pair of steerable wheels mounted on stub axles that are displaceable about swivel pins whose axes do not intersect and are substantially perpendicular to, those of the stub axles, wherein the swivel pins are interconnected by a synthetic plastics member which integrally includes a resilient portion that is arranged to tend to maintain the stub axles substantially perpendicular to the length of the toy and to be resiliently deformed to allow the stub axles to turn about the swivel pins by the application of manual pressure to the toy.

2. A toy vehicle as claimed in claim 1, wherein said member is formed from polypropylene.

3. A toy vehicle as claimed in claim 1 or 2, wherein the swivel pins are formed integrally with swivel blocks, the latter being integrally linked to said member by necks which are resiliently deformable both torsionally and bendably.

4. A toy vehicle as claimed in claim 2 and claim 3, wherein each neck is of circular cross-section having a diameter of about 0.020 inches or 0.51 millimetres.

5. A toy vehicle as claimed in claim 3 or claim 4, wherein each stub axle is integral with the corresponding swivel block.

6. A toy vehicle as claimed in claim 1 or 2, wherein the swivel pins are carried by corresponding swivel blocks, each swivel block being pivotally connected to said member by a pivot pin.

7. A toy vehicle as claimed in claim 6, wherein the pivot pins are integral with the corresponding swivel blocks.

8. A toy vehicle as claimed in claim 6 or 7, wherein said pair of steerable wheels is resiliently suspended.

9. A toy vehicle as claimed in claim 8, wherein the resilient suspension is effected by a resilient strip which normally urges the swivel blocks axially downwardly of the swivel pins towards the chassis or base of the toy vehicle.

10. A toy vehicle as claimed in claim 9, wherein the resilient strip is fastened to the chassis or base of the toy vehicle and acts also to resiliently suspend other ground wheels spaced from said pair of steerable wheels.

11. A toy vehicle as claimed in any preceding claim, wherein said member takes the form of a track rod extending laterally of the toy vehicle and the integral resilient portion takes the form of a strip the plane of which is substantially vertically disposed, said strip extending forwardly of the toy vehicle from the mid-point of the track rod to a relatively perpendicular anchor portion which is fastened on the toy vehicle.

12. A toy vehicle having steering mechanism substantially as hereinbefore described with reference to any of the embodiments illustrated in the accompanying drawings.

13. A toy vehicle as claimed in any preceding claim and simulating the appearance of a saloon car or an ambulance.

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FIG.1

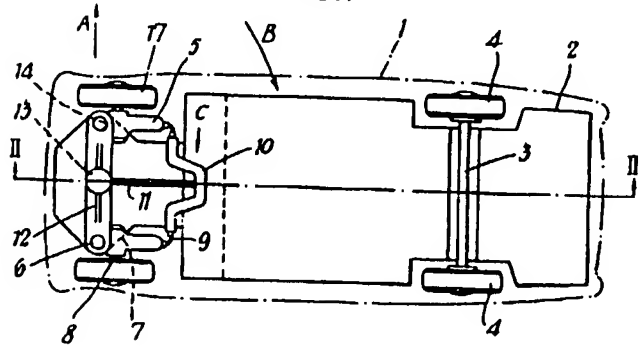
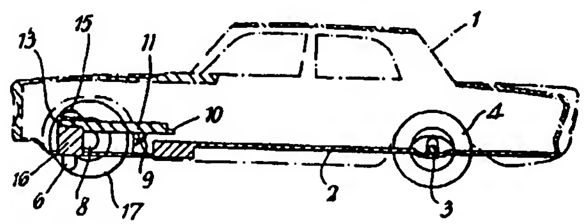


FIG.2



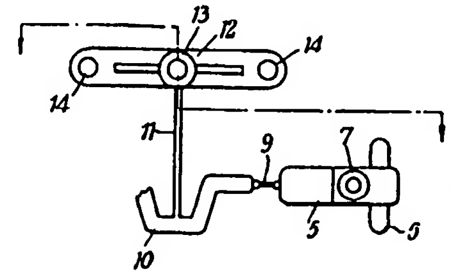


FIG.3

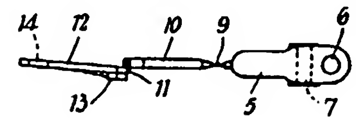


FIG.4

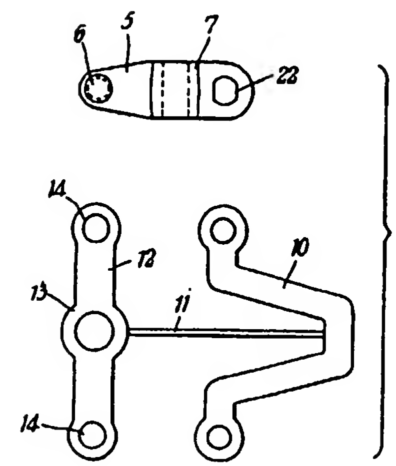


FIG.8

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3 SHEETS This drawing is a reproduction of the Original on a reduced scale.
SHEET 3

FIG.5

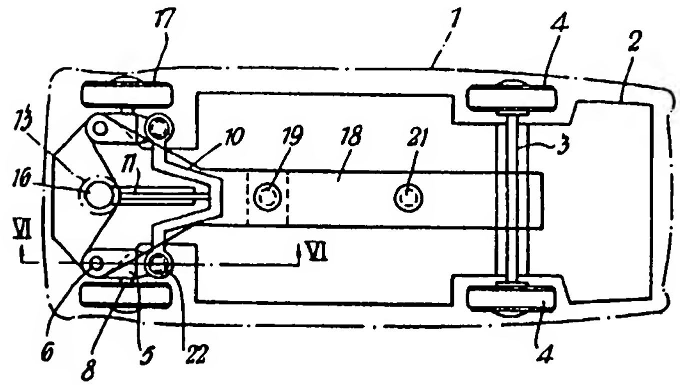

FIG.6

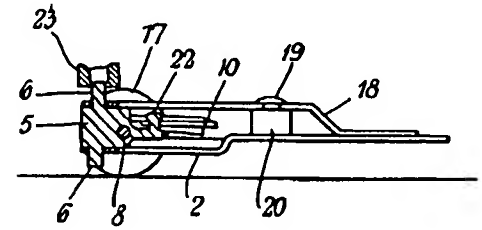

FIG.7